

PCL-PR-001 Rev 2
Hydrofluoric acid and buffered oxide etch of substrates

Henry Lee, Yimin Zhou
July 23, 2008

Prepared By: _____ **Date:** _____

Reviewed By: _____ **Date:** _____

System: Fumehood, wet bench (Center) **Procedure Type:** Wet Etch

1. Scope

Hydrofluoric acid and buffered oxide etch causes severe burns on tissue and the fumes are toxic. This procedure is for the safe use and handling of hydrofluoric acid and buffered oxide etch.

A checklist (PCL-CH-001) must be filled out when running this procedure.

2. Definitions

Hydrofluoric acid , chemical formula HF , 48% (28M) solution.

Buffered oxide etch (BOE) is a 10 to 1 mixture of ammonium fluoride and HF.

3. Requirements

The Users must have been trained in WHMIS (Workplace Hazardous Materials Information System).

The Users must have reviewed the MSDS sheets for hydrofluoric acid and buffered oxide etch.

The Users must have been trained by a competent person and listed on the attached Training Record

4. Procedure

4.1 Get a copy of checklist PCL-CH-001 .

The Lab Manager or Technician must give approval to the user before the use of HF or Buffered oxide etch (BOE).

Have copy of this procedure (PCL-PR-002) on-hand for referral.

4.2 Location

HF, BOE to be used in the Center wet bench in the Cleanroom Lab.
The hood or bench must not have the low air-flow alarm sounding.

4.3 Permitted Times

Procedures using hydrofluoric acid or BOE must never be attempted out of normal working hours (9 AM to 5 PM).

4.4 Persons on hand

Procedures using hydrofluoric acid or BOE must never be attempted by someone working alone. Users must operate in pairs and the two persons must be in the cleanroom .

4.5 Preparation

Follow Section 4.2 of the checklist. Among the items to check are:

Ensure that there is an adequate supply of Calcium Gluconate ointment available.

Review the MSDS sheets on HF and BOE before use.

Review the “ Hydrogen Fluoride Protocol ”

Know where the nearest eyewash and emergency shower is located and how to get to them.

Check the spill kit is available and spill wipes.

4.6 Personal Protective Equipment

Follow Section 4.2 of the Checklist.

Appropriate personal protective equipment must be worn *i.e.* safety glasses, a face shield, PVC or Neoprene gloves which are frequently and carefully checked for damage especially pin holes and a chemical proof apron.

4.7 Supplies

Follow Section 4.3 of the Checklist.

Use only polypropylene containers, stirring rods, beakers.

4.8 General Procedure

Work with the utmost caution.

If at all possible, carry out operations involving HF with one hand (wearing glove). The other gloved hand may then be free for turning on valves in hood area. If gloves become wet or otherwise come into contact with HF, do not turn on any valves or switches until the gloves are rinsed well with water.

If there is any doubt about skin contact with HF, flood area for several minutes (especially under fingernails). HF causes severe burns to skin and eyes that are not immediately painful or visible.

Wash or rinse your hands following the performance of an etch or when moisture that might even remotely contain HF is contacted. If HF is contacted, immediately quench with water.

Rinse gloves frequently with water.

5. Emergency Procedures

Loss of exhaust in wet bench or fumehood

In the event of a loss of exhaust, the alarm on the fumehood and wet benches will start to beep. Unplug any hot plates that are on. Remove any substrates that are submersed in HF or BOE. Cover/cap any open containers of HF and BOE.

Do not attempt to transfer any HF or BOE back into containers.

Leave a DANGER sign taped to the fume hood or wet bench that there is HF and BOE present.

Close the fume hood or wet bench sash.

Ensure all other users leave the cleanroom.

After leaving the cleanroom, tape a DANGER sign on the two cleanroom entrances that there is HF and BOE fumes present.

Do not go back in until the exhaust is restored and the fumes have cleared.

Skin or Eye Exposure:

Immediate washing with large amounts of water. Obtain [First Aid](#). Even if no pain is immediately apparent, affected areas must be treated with calcium gluconate gel. Seek medical attention for all exposure to HF.

Take a copy of the “ HF Medical Treatment Package ” and “Hydrogen Fluoride Protocol “ to the Emergency Ward of the Mt. Sinai Hospital.

Take the tube of calcium gluconate to the Emergency Ward.

Spills

- **For large spills** use “Caution” tape to cordon off the Lab so that no one enters. Contact the University Police 8 2222 and a spill management team with proper respirators, suction equipment will respond. This is especially required for spills that go under the raised lab floor.
- **Small spills** can be neutralized with acid neutralizer and wiped up with high absorbent wipes. Gloves, apron, and face shield must be worn. The wipes have to be carefully double bagged and taken away for special disposal.

6. Waste management

- **Disposal** - spent acid is to be bottled. Traces of acid left over in beakers and labware must be rinsed slowly to a copious flow of water running down a drain. The flow of water must be continued for some time.

Wipes, swabs, gloves that have been used must be doubled bagged in plastic and placed in the fume hood for special disposal.

After use of HF or BOE, contact the Lab Manager or Technician who will do a safety check (storage, cleanup, disposal) of the area with you.

7. References

(adapted from http://www.ece.ucsb.edu/Labs/microfab/cleaning/hf_acid.html and <http://www.chm.bris.ac.uk/safety/hf.htm>)

University of Toronto HF Protocol :
<http://www.ehs.utoronto.ca/Assets/ehs3/Chemical+Safety/HFPRoto.pdf>

8. Revision Information

Rev. 0	Nov. 25/04	Initial procedure development	H. Lee
Rev. 1	April 12, 2006	Minor changes	H. Lee

Rev. 2 July 23, 2008 Use the University of Toronto Medical
Treatment Package

Pierre Martens, H. Lee

9. Training Record

The following is a list of the qualified Users and User training record:

Person Trained

Training by

Date

Authorization